

CLAIMS

1. A high-pressure fluid nozzle comprising a plurality of segments, each segment having an axial bore extending therethrough, the bore of each segment being aligned with the bore of each other segment to form a continuous fluid passage through the plurality of segments, and a containment sleeve for coupling the segments together.

2. The nozzle of claim 1 wherein the containment sleeve is a metallic sleeve shrink-fitted around the segments.

3. The nozzle of claim 1 wherein the containment sleeve is press-fit around the segments.

4. The nozzle of claim 1 wherein the containment sleeve is formed around the segments by metal spray forming.

5. The nozzle of claim 1 wherein the nozzle has a selected length achieved by coupling together a selected number of the segments each segment having a selected length.

6. The nozzle of claim 5 wherein the length of each segment is 0.125-0.75 inch.

7. The nozzle of claim 1 wherein the segments are of different inner dimensions.

8. The nozzle of claim 7 wherein the inner diameter of an uppermost segment is greater than the inner diameter of the remaining segments.

9. The nozzle of claim 1 wherein at least one of the segments is spaced axially from an adjacent segment to form a chamber, and an auxiliary port is in fluid communication with the chamber to connect the chamber to an auxiliary material source.

10. The nozzle of claim 9 wherein the auxiliary material source is air.

11. The nozzle of claim 9 wherein the auxiliary material source is fluid.

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12. The nozzle of claim 9 wherein the auxiliary material source is abrasive.
13. The nozzle of claim 9 wherein the containment sleeve is a metallic sleeve shrink-fitted around the segments.
14. The nozzle of claim 9 wherein the containment sleeve is press-fit around the segments.
15. The nozzle of claim 9 wherein the containment sleeve is formed around the segments by metal spray forming.
16. The nozzle of claim 1 wherein several of the segments are spaced axially from adjacent segments to form multiple chambers, a separate port communicating with each chamber.
17. The nozzle of claim 1, at least one of the segments spaced axially from an adjacent segment to form a chamber, and including at least one sensor in the chamber.
18. The nozzle of claim 17 wherein the sensor senses fluidjet pressure.
19. The nozzle of claim 17 wherein the sensor senses fluidjet temperature.
20. The nozzle of claim 1 wherein the bores of the segments are of varying diameter.
21. The nozzle of claim 20 wherein the bores of the segments near an inlet end of the nozzle are larger than the bores of the segments near a discharge end of the nozzle to form a converging fluid passageway.
22. The nozzle of claim 20 wherein the bores of the segments near an inlet end of the nozzle are smaller than the bores of the segments near a discharge end of the nozzle to form a diverging fluid passageway.
23. The nozzle of claim 1 wherein the segments are formed from different selected materials to achieve a desired wear performance.

24. The nozzle of claim 1, further including a jewel orifice coupled to the nozzle upstream of an inlet end of the nozzle.

25. A nozzle for directing a high pressure fluidjet, the nozzle having a plurality of segments aligned axially adjacent one another, each segment having an axial fluid passage, the fluid passage of each segment being aligned with the fluid passage of an adjacent segment, the number and length of the segments being selected to determine the overall length of the nozzle.

26. A high-pressure abrasive fluidjet system comprising:

a source of high pressure fluid in fluid communication with an orifice to form a high-pressure fluidjet in a head;

a source of abrasive material coupled to the head; and

a mixing tube coupled to the head, the abrasive and high-pressure fluidjet passing through the mixing tube to exit the mixing tube as a high-pressure abrasive fluidjet, the mixing tube comprising a plurality of segments, each segment having an axial bore extending therethrough, the bore of each segment being aligned with the bore of each other segment to form a continuous fluid passage through the plurality of segments, the plurality of segments being coupled together by a sleeve.

27. The nozzle of claim 26 wherein the containment sleeve is a metallic sleeve shrink-fitted around the segments.

28. The nozzle of claim 26 wherein the containment sleeve is formed by metal spray forming.

29. The nozzle of claim 26 wherein the containment sleeve is press-fit around the segments.

30. The nozzle of claim 26 wherein at least one of the segments is spaced axially from an adjacent segment to form a chamber, and an auxiliary port is in fluid communication with the chamber to connect the chamber to an auxiliary material source.

31. The nozzle of claim 26, at least one of the segments spaced axially from an adjacent segment to form a chamber, and including at least one sensor in the chamber.

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32. The nozzle of claim 26 wherein the bores of the segments are of varying diameter.

33. The nozzle of claim 26 wherein the segments are formed from different selected materials to achieve a desired wear performance.

34. A method of constructing a high pressure fluidjet nozzle having an inlet end and a discharge end, comprising:

forming a plurality of individual segments, each having an axial bore; and

joining the segments with the axial bores aligned with one another to form a fluidjet passage between the inlet end of the nozzle and the discharge end.

35. The method of claim 34, further comprising spacing at least two of the segments axially from one another to form a chamber between the segments through which a material may be introduced into the nozzle.

36. The method of claim 34, further comprising spacing at least one of the segments axially from another adjacent segment to form a gap through which one or both of the temperature and pressure of the jet may be sensed.

37. The method of claim 34, further comprising shrink-fitting a metallic sleeve around the segments to couple the segments.

38. The method of claim 34, further comprising press-fitting a sleeve around the segments.

39. The method of claim 34, further comprising forming a sleeve around the segments by metal spray forming.

40. The method of claim 34 wherein the axial bore of one segment is wider than the axial bore of an adjacent segment, and the step of joining the segments includes placing the segment with the wider bore closer to the inlet end of the nozzle than the discharge end of the nozzle to form a converging fluidjet passage from the inlet end of the nozzle to the discharge end.

41. The method of claim 34 wherein the axial bore of one segment is larger than the axial bore of an adjacent segment, and the step of joining the segments includes placing the segment with the larger bore closer to the discharge end of the nozzle to form a diverging fluidjet passage from the inlet end of the nozzle to the discharge end.

42. The method of claim 34, further comprising coupling a jewel orifice to the inlet end of the nozzle in axial alignment with the bores in the segments.

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FOI b7D b7E b7F b7G b7H b7I b7J b7K b7L b7M b7N b7O b7P b7Q b7R b7S b7T b7U b7V b7W b7X b7Y b7Z b7AA b7AB b7AC b7AD b7AE b7AF b7AG b7AH b7AI b7AJ b7AK b7AL b7AM b7AN b7AO b7AP b7AQ b7AR b7AS b7AT b7AU b7AV b7AW b7AX b7AY b7AZ b7BA b7BB b7BC b7BD b7BE b7BF b7BG b7BH b7BI b7BJ b7BK b7BL b7BM b7BN b7BO b7BP b7BQ b7BR b7BS b7BT b7BU b7BV b7BW b7BX b7BY b7BZ b7CA b7CB b7CC b7CD b7CE b7CF b7CG b7CH b7CI b7CJ b7CK b7CL b7CM b7CN b7CO b7CP b7CQ b7CR b7CS b7CT b7CU b7CV b7CW b7CX b7CY b7CZ b7DA b7DB b7DC b7DD b7DE b7DF b7DG b7DH b7DI b7DJ b7DK b7DL b7DM b7DN b7DO b7DP b7DQ b7DR b7DS b7DT b7DU b7DV b7DW b7DX b7DY b7DZ b7EA b7EB b7EC b7ED b7EE b7EF b7EG b7EH b7EI b7EJ b7EK b7EL b7EM b7EN b7EO b7EP b7EQ b7ER b7ES b7ET b7EU b7EV b7EW b7EX b7EY b7EZ b7FA b7FB b7FC b7FD b7FE b7FF b7FG b7FH b7FI b7FJ b7FK b7FL b7FM b7FN b7FO b7FP b7FQ b7FR b7FS b7FT b7FU b7FV b7FW b7FX b7FY b7FZ b7GA b7GB b7GC b7GD b7GE b7GF b7GG b7GH b7GI b7GJ b7GK b7GL b7GM b7GN b7GO b7GP b7GQ b7GR b7GS b7GT b7GU b7GV b7GW b7GX b7GY 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